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Fixed-price-award-fee: an economic motivational, and contracting theory analysis

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THESIS

FIXED-PRICE-AWARD-FEE: AN ECONOMIC
MOTIVATIONAL, AND CONTRACTING
THEORY ANALYSIS

by

Don F. Schade

December 1990

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The award fee is a unique incentive structure that provides the government a method of subjective, after the fact evaluation of contractor performance and affords the Government additional flexibility to reward a contractor for above average performance. Additionally, the award fee is not subject to the disputes clause of a Government contract. Use of award fee serves to enhance contractor performance in areas of quality, production management, ingenuity, timeliness, and cost effectiveness. Currently, the award fee is mostly utilized under cost reimbursement contracts. In order to obtain the full benefit of the award fee, its use in fixed price contracts should be considered. An analysis from the perspective of economic theory, motivational theory, and contracting theory was conducted. In addition, perspectives from Government and private sector contracting

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Fixed-Price-Award-Fee: An Economic Motivational, And Contracting Theory Analysis

by

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ABSTRACT

The award fee is a unique incentive structure that provides the Government a method of subjective, after the fact evaluation of contractor performance and affords the Government additional flexibility to reward a contractor for above average performance. Additionally, the award fee is not subject to the Disputes clause of a Government contract. Use of award fee serves to enhance contractor performance in areas of quality, production management, ingenuity, timeliness, and cost effectiveness. Currently, the award fee is mostly utilized under cost reimbursement contracts. In order to obtain the full benefit of the award fee, its use in fixed price contracts should be considered. An analysis from the perspective of economic theory, motivational theory, and contracting theory was conducted. In addition, perspectives from Government and private sector contracting personnel were obtained to determine the most effective utilization of an FPAF contract.

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I. INTRODUCTION

A. GENERAL COMMENTS

The award fee is a unique incentive structure that provides the Government a method of subjective, after the fact evaluation of contractor performance and affords the Government additional flexibility to reward a contractor for above average performance. Additionally, the award fee is not subject to the Disputes clause of a Government contract. Use of award fee serves to enhance contractor performance in areas of quality, production management, ingenuity, timeliness, and cost effectiveness. Currently, the award fee is mostly utilized under cost reimbursement contracts. Limiting the use of award fee provisions to cost reimbursement contracts restricts the Government's ability to derive the full benefit of an award fee incentive. In order to obtain the full benefit of the award fee, its use in fixed price contracts should be considered.

Determining how Fixed-Price-Award-Fee contracts could be effectively utilized is an important step in advocating the authorized and practical use of this method of contracting. In addition, discussion of defense contractors' viewpoints and issues regarding this type of contracting is important in determining its acceptance by the companies that will ultimately be awarded the contract.

B. RESEARCH OBJECTIVES

The objectives of the research are:

1. To determine how a new contract type, one that combines the characteristics of a fixed price contract with an award fee, called Fixed-Price-Award-Fee (FPAF) contract, could be utilized effectively in the Federal acquisition process.

2. To determine how Government contracting officials and defense contractors would react to its use and investigate issues and viewpoints regarding the use of this new type of contract.

3. To evaluate the economic and motivational theory of the FPAF incentive to determine key features that justify its use in various contracting situations.

C. RESEARCH QUESTIONS

Based on these objectives, the primary research question is:

After application of economic, motivation, and contracting theory, in what situation might a Fixed-Price-Award-Fee (FPAF) contract be utilized to provide for an effective use of the incentive in the Federal acquisition process?

Secondary research questions include:

1. How do defense contractors and Government officials view the use of Fixed-Price-Award-Fee (FPAF) as an incentive arrangement in conducting business?

2. How might a Fixed-Price-Award-Fee contract be structured to provide for an effective use of award fee incentives in the Federal acquisition process?

D. SCOPE

The scope of the thesis focuses on applying economic, motivational, and contracting theory to the FPAF incentive arrangement, as well as obtaining perceptions of Government and private sector contracting practitioners, in order to

determine what is the most advantageous use of FPAF, and how its use should be implemented.

Primary research for practitioner viewpoints will be in the form of personal and phone interviews with acquisition personnel from private sector contractors and Government procurement offices.

Economic incentive research was based on applied economic theory obtained from research of current economic studies. Contracting theory derived, from Cost-Plus-Award-Fee contract studies, was applied to the fixed price environment. The FPAF contract has only been utilized on a very limited basis.

E. METHODOLOGY

To answer the primary and secondary research questions, three research techniques were employed. First, a comprehensive search of available literature dealing with incentive and award fee contracting, contractor motivation, motivational theory, and economic theory was conducted. Second, an economic model was utilized to evaluate the economic value of the Fixed-Price-Award-Fee incentive. Third, research data were collected in the form of personal interviews and phone interviews with acquisition personnel from the Government and private sector. A list of the people interviewed appears in Appendix A of this thesis, and a list of the general interview questions appears in Appendix B.

F. LIMITATIONS

The major limitation to this study was the lack of specific data on the topic. The FPAF contract type has been used on only a limited basis.

G. ASSUMPTIONS

This study assumes that the reader commands a general knowledge or basic familiarity with Federal contracting language and the Federal acquisition process. It is further assumed that the reader is aware of the relationship that exists between industry and the Federal Government in contracting methodology.

H. ORGANIZATION OF THE REPORT

The research is organized in the following manner: Chapter I contains the introduction and research questions to be analyzed. Chapter II contains relevant background information on incentive contracting history and theory. Chapter III contains economic theory and economic model application for the Fixed-Price-Award-Fee incentive. Chapter IV discusses contractor and Government motivational theory and applies the theory to FPAF. Chapter V discusses the advantages and disadvantages of an FPAF contract as determined by discussion with acquisition personnel for the Government and defense contractors. Chapter VI provides conclusions derived from the research, and recommendations on the use of the Fixed-Price-Award-Fee contract by Federal agencies.

II. BACKGROUND

A. INTRODUCTION

Civilian contractors produce over 98% of the material required and utilized by the United States Armed Forces. Incentive pricing arrangements or incentive contracts are utilized by procurement personnel in the Federal Government as a catalyst to motivate the contractor to perform in a prescribed manner. The objective of the incentives, as primarily utilized by the Federal Government and the Department of Defense, is to compel the contractor to keep the total cost of the contract as low as possible while still satisfying the minimum needs specified and required by the end user and written in the contract.

Discussion of incentive pricing arrangements requires investigation of contractor motivation. Different pricing arrangements motivate contractors in different ways. The general guidance provided in the Federal Acquisition Regulation (FAR) is as follows:

> Incentive Contracts . . . are appropriate when a firm fixed price contract is not appropriate and the required supplies or services can be acquired at lower costs and, in certain instances, with improved delivery or technical performance, by relating the amount of profit or fee payable under the contract to the contractor's performance. [Ref. 1:p. 16.401 (a)]

It should be noted that a fixed price contract is not designated as an "incentive contract" in the Federal Acquisition Regulation, however it creates a powerful

incentive for the contractor to keep its cost lower in order to earn greater profit on that individual contract.

To prevent confusion between a contracting practitioner's definition of profit and an economist's definition it is necessary to distinguish between the two. Incentive contracts assume the contractor is motivated by short term monetary profit on a single contract. Long term profit encompasses the non-profit objectives that contribute to long term profitability. The firm may be willing to sacrifice some short-term monetary profits on one contract in the interest of increasing long term profits. These factors may be termed objectives other than profits, but economists like to define long term profits very broadly so that sales, follow-on work, product quality, etc. all can be included under long term profit.

B. THEORY OF INCENTIVE CONTRACTS

The Department of Defense sometimes has difficulties getting contractors to perform the necessary actions or tasks called for in the contractual document. For example, contractors for whatever reason, may fail to deliver the item required on time or within costs. In this case, it may be in the Government's best interest to attempt to motivate the defense contractors with additional incentives to get them to perform as required. In fact, incentive contracting was believed to be the panacea - the stimulus - to motivate contractors. [Ref. 4:p. 4]

Incentive contracting is not unique to the Government. Basically the same contract types exist in the commercial world. However, because contracts between commercial firms do not usually involve excessive risk, the use of cost type contracts is limited. Fixed price contracts are typically used when the level of risk is low. Incentive contracting is more widely used by the Government because of risk factors involved with the type of products the Government procures.

In the absence of market forces, the price is determined through negotiations between the buyers and sellers. Therefore, in order to determine incentive arrangements that will be efficient and effective it is important to review both contractor and Government objectives.

Contractor objectives can be divided into contractual objectives and long term corporate goals. These two categories are related in that the collective objectives of performing all Government contracts must reflect the overall long term strategy. Previous research has determined that corporations and firms have other objectives besides short term profit. [Ref. 5:p. iii] Any one contractor could have a number of different objectives.

The short term profit objective is not as strong as one might think. Most managers strive for satisfactory short term rather than maximum short term profit. Short term profit maximization in many cases is dangerous in that it might encourage the contractor to take every possible cost-saving

shortcut not expressly prohibited in the contract. [Ref. 6:p. 14] This incentive might be particularly strong on an individual contract. However, continuation of cost saving short cuts might detract from long term profit maximization. Other objectives are important for long term profits including company growth, providing a good product, market share, developing new skills, guaranteeing follow on work, controlling one's own destiny, safeguarding proprietary interests, responding to the customer, utilizing excess capacity, and improving cash flow. All of these items have been cited as prime business objectives. [Ref. 5]

Once contractor objectives have been identified, the performance of the contractor can be guided and improved if the Government "helps" the contractor achieve these objectives. [Ref. 6:p. 16]

The Government, like the contractor, has many varied objectives on any given contract. Two classifications of Government objectives exist: contractual objectives and extra contractual objectives. The three primary Government contractual objectives include:

1. Obtaining the exact item or service called for in the specifications of the contract.
2. Obtaining it at a fair and reasonable price.
3. Ensuring on-time delivery.

Extra-contractual objectives are those that result from the implementation of socio-economic objectives through the contracting process. These include small and disadvantaged

business provisions, labor surplus set asides, employment of the handicapped, and preference for domestic material (Buy American). [Ref. 6:p. 16]

The Government should want to enhance contractor performance, but because of the unique defense acquisition environment, many other influences come in to play in the final determination of how and to whom a contract is awarded. Statutory and regulatory restraints limit the contracting officer's flexibility in the award of contracts. Limited flexibility in source selection tends to limit the use of certain incentives. The amount of short term profit payable to contractors on negotiated procurement is limited by the weighted guidelines profit determination method. The Government is also limited by the regulations placed on advance payments, progress payments, and multi-year contracting, all of which are effective contracting incentives. [Ref. 6:p. 17]

In any contractual arrangement between a contractor and a client, both parties will try to promote their interests by introducing contract conditions that will protect their final goals. [Ref. 7:p. 23]

Studies conducted in the area of incentive contracts are in general agreement that short term profit maximization is not the typical defense contractor major motivation.

> Short term profit is not a defense contractor's only concern. Defense contracts are sought to cover payroll and overhead costs, and to provide company personnel with the opportunity to develop technical and managerial skills

useful in commercial and defense business. Once a contract is won, a company seeks every opportunity to add work and funds to the program. The need for follow on work is crucial, since (1) the initial effort to secure a contract involves a large outlay of money, and (2) there is usually long time laps between contracts for the same weapons systems. [Ref. 8:p. 27]

The presumption of short term profit as the basic motive of industry is true in that in the open market the firm will not survive without profit. For DOD, it is an overly simplistic approach since it is based on a questionable assumption of operating in an open market. Also, it is a general assumption applied as a rule to almost all contracts. [Ref 4:p. 37]

As a general observation, profitability of Government business when compared to other business (commercial) showed an average of 14.8% profit before taxes for commercial business compared to 5.6% profit for Government business. [Ref. 4:p. 39] This type of analysis might be misleading in that the Government awards many cost reimbursement contracts where the risk to the contractor is significantly reduced. This may skew the data towards an indication that profit on Government contracts is substantially less then in commercial business, however what must be measured is profit on the same level of risk.

With the majority of studies indicating that short term profit is not the major motivating factor for defense contractors, it is a paradox that this is the main factor in the current structure of incentive contracts. One opinion is

that the DOD policy evolved to its current state because it is easy for contracting officers to understand. Profit maximization principles have been ingrained to most contracting officers. [Ref. 8:p. 28] Another factor is that when incentive contracts were evolving, what started as rules of thumb (profit maximization) became hard and fast rules. [Ref. 4]

Incentive contracts, termed economically as a linear payment schedule, are contracts where the buyer pays a fixed fee plus some proportion of project cost. The remaining proportion of project costs is borne by the seller. The seller's proportion is usually called the sharing ratio. A higher sharing ratio creates more incentive to reduce cost. It also makes the contractor bear more risk. An optimal sharing ratio depends on uncertainty, risk aversion, and contractor's ability to control costs. Economists state that an efficient incentive contract can be derived by clearly showing the tradeoff between risk sharing and incentives. [Ref. 9:p. 719] A balance must be struck between the positive incentive effect of a high sharing ratio and the negative risk effect.

The effectiveness of incentives as instruments of motivation cannot be measured by examining contract results alone. Research in the area of incentive effectiveness did not reveal exactly the same results, however several findings were common. They include:

1. A contractor rarely seeks to maximize profits during the short run of a single contract.

2. Incentives have not been effective as protection against cost growth.

3. Incentives are costly to negotiate and administer, to both the Government and contractors.

4. Contractors will not sacrifice performance attainment for short term profit on a single contract. Performance is of such paramount importance to company image and future business acquisitions that performance incentives provide little if any additional motivation to the contractor.

5. It is often impossible to pass incentive motivation to the people who carry out the contract effort on a day to day basis, primarily because it is difficult to relate individual activity with any specific contract.

6. When a contractor discovers that his incentive arrangements do not correspond to the Government's interest, he ignores the incentive.

7. Incentives serve to discipline the planning efforts of DOD personnel. (requirement analysis is more thorough) [Ref. 6:p. 26]

The major problem with incentive contracts seems to be that the Government has a hard time determining an appropriate target cost, an essential element of all incentive contracts. If the target cost is too high, there can be little incentive to control costs. The resulting underruns are not the result of increased efficiency. If the target cost is too low, the contractor will not meet the target cost without compromising the product. The problem is created because it is in the contractor's best interest to have a high target cost and in the Government's best interest to have a low one. The contractor has an incentive to distort estimates concerning true expected costs. The problem can be reduced by specifying

the relationship between target cost and sharing ratio. The objective of the contracting officer is to get the contractor to reveal true expected costs.

The second major problem is that the Government's policy implies that for an incentive to be effective the contractor must be motivated by extra profits on a particular contract. It ignores the other contractor motivators. [Ref. 6:p. 28]

Another side to contractor motivation consists of penalties. Penalties sometimes are better motivators than rewards. If an incentive is structured in a manner that it definitely motivates the contractor, penalties or negative fee might not be applicable. But in the defense contracting world, where there are strong drives to incur costs, penalties might be appropriate. The best type of penalties seem to be a form where the contractor starts out with a maximum fee and can only lose it. [Ref. 10] There is a risk that contractors will not bid if excessive penalties are imposed. It is apparent that in order for incentives to work they must be in areas that motivate the contractor. Contractor motivation is complex and is a function of many contract and non-contract factors, beyond short term profit. Government should consider motivation in pre-award planning. The emphasis of incentives should reside in cost control rather than maximization of short term profit. Penalties should be used on the over-run side of targets. More attention should be paid to the extra contractual factors when selecting contract structures.

If profit on a single contract (short term profit) is not the major contractor motivator, the current structure of incentive contracts must be changed. Expanded incentive contract types should be developed as opposed to the basic incentive contracts promulgated in the Federal Acquisition Regulation. With factors such as company growth, market share, and guarantee of follow on work determined to outweigh short term profit, perhaps statutory and regulatory changes should be enacted that will allow contracting officers to develop incentive contracts that provide for follow on work if certain goals are met. Penalties should be used with discretion, as reduction in the industrial base because of Government micro management and burdensome paperwork has become apparent.

John J. Kennedy, author of "Incentive Contracts and Cost Growth" says about incentives:

> Most incentives, even if they were well constructed, are destroyed by the administrative process. To have any chance of being effective, the goals have to be meaningful, achievable, and the rewards allocated in a timely manner. Right now, all these requirements are undermined by the administrative process.

In light of the current statutes and regulations it is necessary for contracting officers to recognize motivational factors besides profit, and determine which factors will stimulate and motivate the contractor to improve his performance. The proper motivational tool must be incorporated into the contract, and then the contract must be properly administered to ensure effective results. [Ref. 8:p. 28]

C. DEPARTMENT OF DEFENSE CONTRACT TYPES

Contract types vary according to the responsibility assumed by the contractor for the costs of performance and the amount and nature of the profit incentive offered to the contractor for achieving or exceeding specified standards. The contract types are split into two categories. These are fixed price contracts and cost reimbursement contracts.

1. Fixed-Price Contracts

The Federal Acquisition Regulation (FAR) states,

> Fixed-Price contracts provide for a firm price or, in appropriate cases, an adjustable price. Fixed-price contracts, providing for an adjustable price may include a ceiling price, a target price (including target cost), or both. Unless otherwise specified in the contract, the ceiling price or target price is subject to adjustment only by operation of the contract clauses providing for equitable adjustment or other revision of the contract price under stated circumstances. [Ref. 1:p. 16.201]

This type of contract "locks in" the price of the product or service at the time of contract award and does not allow any adjustment in contract price, except as may be allowed by specific contract clauses incorporated into the contract.

a. Firm-Fixed-Price Contract

A Firm-Fixed-Price (FFP) contract places the burden of cost risk on the contractor and "provides maximum incentive for the contractor to control costs and perform effectively and it imposes a minimum burden upon the contracting parties" [Ref. 1:p. 16.202-1].

A firm fixed-price contract is suitable for acquiring commercial products or commercial-type products or for acquiring other supplies or services on the basis of detailed specifications when the contracting officer can establish fair and reasonable prices at the outset. Establishment of a fair and reasonable price entails attaining adequate price competition. It is important that in FFP situations, performance uncertainties can be identified and a reasonable estimate of their costs are available.

b. Other Fixed-Price Contracts

Besides firm-fixed-price, other major fixed price contract types that are discussed in the FAR include:

(1) Fixed-price with economic price (FPE) adjustments which allow adjustment in final price based on input material price changes. This type of contract can be utilized when there is instability in market or labor conditions.

(2) Fixed-price incentive (FPI) is a fixed-price contract that provides for adjusting profit and establishing the final contract price by a formula based on the relationship of final negotiated total cost to total target cost. An FPI contract is appropriate when the parties can negotiate at the outset a firm target cost, a target profit, a profit adjustment formula that will provide for a fair and reasonable incentive, and a ceiling that provides for the contractor to assume an appropriate share of the risk. FPI contracts can

have a firm target (FPIF) or successive targets (FPIS) which can be used when all pricing information is not available at the onset of negotiations.

2. Cost-Reimbursement Contracts

Cost-reimbursement contracts provide for payment of allowable incurred costs, to the extent prescribed in the contract. These contracts establish an estimate of total cost for the purpose of obligating funds and establishing a ceiling that the contractor may not exceed without approval of the contracting officer. Cost-reimbursement contracts are considered suitable when uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy to use any type of fixed-price contract.

The major cost contracts discussed in the FAR include:

a. Cost-plus-fixed-fee (CPFF) contracts are cost-reimbursement contracts that provide for payment to the contractor of a negotiated fee that is fixed at the inception of the contract. This contract type permits contracting for efforts that might otherwise present too great a risk to contractors, but it provides only a minimum incentive to control costs.

b. Cost-plus-incentive-fee (CPIF) contracts are cost-reimbursement contract that provide for an initially negotiated fee to be adjusted later by a formula based on the relationship of total allowable costs to total target costs. This contract type specifies a target cost, a target fee,

minimum and maximum fees, and a fee adjustment formula. After contract performance, the fee payable to the contractor is determined in accordance with the formula. The fee adjustment formula should provide an incentive that will be effective over the full range of foreseeable variances from the target cost.

c. Cost-plus-award-fee (CPAF) contracts are a cost-reimbursement contract that provides for a fee consisting of a base amount fixed at inception of the contract and an award amount that the contractor may earn in whole or in part during performance and that is sufficient to provide motivation for excellence in such areas as quality, timeliness, technical ingenuity, and cost effective management. The amount to be paid is determined by the Government's subjective evaluation of the contractor's performance in terms of the criteria stated in the contract.

D. AWARD FEE CONTRACTS

Under award fee provisions a Government monitor unilaterally determines all or part of a contractor's fee on the basis of subjective, after the fact evaluation of contractor performance. A concept similar to the award fee has existed in Federal contracts since the 1950's, however extensive use of the award fee technique did not occur until the 1960's when NASA and the Navy utilized award fee contracts for maintenance and operation of various facilities. [Ref. 11]

The academic framework of the concept is usually attributed to Frederic M. Scherer, who devotes a full chapter in his 1964 work, "The Weapons Acquisition Process: Economic Incentives", to after the fact evaluation. Scherer's proposed incentive strategy, like the award fee practice common today, relied on retrospective evaluations of contractor performance by "knowledgeable persons of sound judgement". [Ref. 12:p. 329] He went on to propose that a central organization of 6 to 10 such persons, called a Performance Evaluation Board, would make periodic, after the fact contractor evaluations and control bias in those evaluations. He expected that the board would use a variety of evaluation factors for each assessment and that the contractor would subsequently be rewarded for effective performance either by high profit or opportunity for sales. [Ref. 12]

The award fee in use today contains a fee structure that consists of a fixed amount, called the base fee, that does not vary with performance and which could be zero; and an award amount, called the award fee pool, which, in addition to the fixed amount, is earned according to preestablished criteria. It is used to encourage the attainment of excellent contract performance. Under an award fee arrangement, the base fee is designed to compensate the contractor for factors such as risk assumption, investment, and the nature of the work. The award fee pool represents an additional amount available to the contractor to earn for performance that demonstrates quality

efforts towards accomplishing the tasks and functions required by the contract. [Ref. 11:p. 4]

The FAR describes the award portion of the CPAF contract in the following manner:

> . . . an award amount that a contractor may earn in whole or in part during performance and that is sufficient to provide motivation for excellence in such areas as quality, timeliness, technical ingenuity, and cost effective management. The amount of the award fee to be paid is determined by the Government's judgmental evaluation of the contractor's performance in terms of the criteria stated in the contract. This determination is made unilaterally by the Government and is not subject to the Disputes clause. [Ref. 1:p. 16.404-2 (a)]

The fact that the award fee can be based on subjective evaluation and cannot be disputed relieves the Government of the fear that the contractor would challenge the evaluation of the Government. Therefore, the Government is free to evaluate performance subjectively, as long as the award criteria delineated is adhered to. Utilization of CPAF contracts is authorized when it is not considered feasible or effective to use a contract that uses predetermined objective incentives applicable to cost, technical performance or schedule. Consideration is also warranted to the fact that meeting acquisition objectives will be enhanced by using the contract. Specifically, in terms of contract administration, what must be considered is that any additional administrative effort and cost required to monitor and evaluate performance must be justified by the increase in expected benefits. [Ref 1:p. 16.404-2 (b) iii]

The contract by its nature assumes additional administrative effort and cost are going to be involved. Award fees are most suitable for use with contracts in which it is difficult to measure performance, and where the Government wants to play an active role in the management of the contract. However, when it is used, several benefits are derived from its use. They include:

1. encourages Government-contractor cooperation,
2. assures an active role for Government managers,
3. recognizes limitations on top management ability to control operations,
4. stimulates formal and informal communication,
5. recognizes variability of motivation,
6. leaves to contractors the task of motivating their own personnel,
7. views the acquisition process as dynamic,
8. is flexible and provides room for human judgment,
9. simplifies contractual provisions, and
10. helps assure that profits are earned. [Ref. 13:p. 7]

Prior to actual contract administration, it is important in an award fee contract that appropriate effort and consideration be devoted in the determination of the evaluation criteria. An analysis of the performance work statement should be performed to determine the areas that the Government considers essential to successful contractor performance. Performance can be considered over broad categories, however, each broad category can be broken down

into more specific elements. The broad categories include, but are not limited to: performance of work, technical management, business management, cost control, and quality control. In selecting performance criteria for the award fee pool, it is important not to use meaningless or confusing elements because of the probability that they will lead to unwanted results or reduce contractor motivation.

Several questions that should be asked of the performance elements include:

1. Is the element meaningful and important to overall performance?

2. Is it consistent with other elements in the plan?

3. Is the element sending the right message to the contractor regarding performance? [Ref. 14:p. 10]

Affirmative answers regarding the above questions will significantly smooth the contract administration process over the life of the contract.

In the award fee determination process, it is critical that the award fee plan contain appropriate checks and balances to maintain impartiality. Monitoring, assessing, and reporting should be performed by personnel who are familiar with the contract requirements. In turn the results should be subject to approval of more senior personnel who are not involved with day to day operations of the contract. A layered system of performance evaluation should assure the Government and the contractor that an informed and reasonable judgement has been made regarding the amount of the award fee.

It is especially important to demonstrate impartiality to the contractor because he does not have the rights provided in most contracts by the Disputes Clause.

The three basic layers for administering an award fee contract include:

1. Award Fee Determination Official (AFDO)
2. Award Review Board; and
3. Performance monitoring activities.

Award fee contracting requires that there will be an AFDO and that this person will be an individual who is at a higher level organizationally than the people involved directly in performance evaluation. The AFDO's primary responsibility is determination of the award fee earned and payable for each evaluation period and instituting changes to any portion of the award fee structure as appropriate. [Ref. 14:p. 25]

The Award Review Board is established to evaluate contractor performance, based on input from the activities responsible for monitoring contractor performance. In addition, they recommend the amount of award fee to the AFDO. The membership of the board should be based on the nature, dollar value, and complexity of the procurement. [Ref. 14:p. 25]

The primary responsibility for monitoring and initial assessment of contractor performance is assigned to the Contract Administration Office (CAO). The policies and procedures for obtaining and providing interagency contract

administration and audit services are delineated in Part 42 of the FAR and state that the goals are to, "provide specialized assistance through field offices located at or near contractors' establishments, avoid or eliminate overlapping and duplication of Government effort, and to provide more consistent treatment of contractors." [Ref. 1:p. 42.100] The Procuring Contracting Officer (PCO) delegates contract administration to the CAO and the CAO provides support to contract administration.

The Award Fee process and CPAF contract seem to be treated as just another type of incentive contract, however due to its uniqueness it has the potential of instilling an improvement in Government-Contractor relationships. There is evidence that the award fee process builds team spirit, fosters communication at all levels, and instills a pride of belonging. [Ref. 15:p. 468] The award fee process is considered a management system, far more than it is just a contract type, and the decision to use an award fee is fundamentally a selection of a management approach. With an award fee, the Government has more day to day insight into the contractor's actions. The contractors activities are also more visible to the Government. [Ref. 15:p. 469]

Because of the close relationship required, it can be argued, especially by DOD contracting personnel, that the Government does not have the time, people, and dollars available to administer a normal CPAF contract. This

constraint relates directly to the third consideration of FAR 16.404-2, concerning the cost and administrative effort involved with using CPAF contracts. The give and take on the part of the Government and contractor during the award fee process is very worthwhile from a contract management point of view, however it results in many hours of work on the part of the Government. Although, the award fee determination is not subject to appeal, the AFDO needs to be very certain the Government's determination is fair. In the real world, because of the time and cost necessary to administer a CPAF contract, program managers and contracting personnel are more likely to utilize a CPFF or CPIF contract for their requirements. [Ref. 16:p. 486]

From the contractors' point of view, there is strong evidence that the contractors have strong feelings against too much involvement in contractor operations. The contractors like cost-type contracts, but resent too much day to day interference. However, with experienced competent personnel to take full advantage of the award fee contract's potential, the process can be very beneficial. It is important that meaningless paperwork be minimized and that the process be matched to the program. [Ref. 15:p. 470]

It is believed that in order to achieve the full benefits of the award fee process and its superior motivational elements, efforts need to be made to reduce the administrative difficulty associated with the use of these contracts. Dr.

Arthur C. Meiners of Marymount University has proposed a simplified cost-plus-award-fee contract. The basis behind it is that evaluation periods would be standardized and that the award fee determination process would be handled solely by the AFDO and the applicable Government contracting officer. This is in keeping with encouragement of streamlining Government contracting efforts. [Ref. 16:p. 488]

Another proposal that is gaining steam is the use of the award fee in a fixed-price environment. This idea appears to be in line with reducing paperwork and administrative oversight. Perhaps Dr. Meiners' simplified approach to award fee united with fixed-price contracts could be an answer to improving contractor performance in Government contracts.

E. FIXED-PRICE-AWARD FEE CONTRACT

The fixed-price-award fee is considered a hybrid type contract because the contract utilizes two component parts, a fixed price component and an award fee component. These components differ substantially from the fixed-price arrangement in that contractor incentives for performance are present and the risk apportionment is shifted.

The fixed-price-award fee (FPAF) contract is not recognized as a specific contract type by the Federal Acquisition Regulation (FAR). In a firm fixed-price (FFP) contract, all cost risk is borne by the contractor. The FFP gives the contractor considerable incentive to control costs, since this would increase his profit. However, this incentive

tends to be a disadvantage to the Government if the contractor is only concerned with short term profit on a single contract, because the contractor could most readily control costs by sacrificing quality. [Ref. 17]

In the FPAF, the "award fee" is a bonus for higher than standard levels of performance. If the contractor expends no effort to meet those higher levels, it incurs no risk and earns no fee. If the contractor expends effort and resources to achieve a higher performance level, a part of the Award Fee is earned. This incentive approach should not force the contractor to undertake high risk, but provides motivation to undertake some risk in order to get a better return on investment. The maximum fee percentage is specified in the contract, and the amount received is determined unilaterally by the Government on assessments of performance periodically over the terms of the contract.

III. ECONOMIC ANALYSIS OF FIXED-PRICE-AWARD FEE CONTRACTS

A. INTRODUCTION

The economic theory of procurement is intended to describe the acquisition of items, particularly major weapons systems or other large scale, high dollar value items, utilizing economic factors and trade-offs. Using economic theory to help determine the appropriate contract type could be a valuable indicator as to which pricing arrangement a Government contracting officer should utilize for the various procurements under their cognizance. In narrowing down the scope of this thesis, the question becomes whether to use a Fixed-Price-Award-Fee (FPAF) or a Firm-Fixed-Price (FFP) contract. This chapter is intended to describe, from an economic point of view, what factors should be assessed to make that determination.

B. ECONOMIC THEORY

A contract between the Government and a contractor can be described economically as a principal-agent relationship. A principal-agent relationship exists when the Government wants to employ the contractor to develop a product or perform a service. Principal-agent or Government-contractor conflicts arise because both parties have different objectives. The Government usually wants to minimize cost for a given performance level and scheduled delivery. The contractor can

be motivated by short term profits on the specific contract or other long term objectives. Specific contractor motivations are discussed in Chapter IV. Obviously, because the objectives of the Government and the contractor are different, and information is critical for price negotiations, the sharing of all information concerning the project does not occur.

The cost of obtaining information concerning all aspects of performance in a particular procurement is critical, from an economic standpoint, in determining whether to use an FFP or an FPAF contract. A firm fixed-price contract usually requires that the Government and the contractor have a great amount of information concerning the actual cost of performance, prior to the negotiating a final price. The cost of obtaining this information should be a factor in the final price awarded for a firm-fixed-price contract.

The amount of information available to both the Government and the contractor can also be associated with the amount of risk involving a particular contract. Increased information obviously reduces uncertainty and therefore reduces risk for the party that obtains the information. The Government can reduce the amount of uncertainty by expending resources to obtain additional information for this particular purchase or by drawing on experience from procuring a similar item. A contractor can also reduce uncertainty and risk by obtaining additional information or drawing on past experience in

manufacturing a similar or equal item. If this has not occurred, and the amount of risk associated with the procurement is considered excessive, then most likely the Government is in a situation where a firm-fixed-price or fixed-price-award-fee is not a viable option. A cost type contract would most likely be utilized in this situation.

The amount of information required in determining the contract type is dependent on the level of detail required to specify the level of performance. In the case of the choice between an FFP and an FPAF contract, there must be enough information available to both parties that there is no excessive risk. However, it may be ill-advised to write a firm-fixed-price contract because of the difficulty or cost involved in specifying the desired level of performance in advance.

The reason that this difficulty occurs is that better information may become available at a later time. In this situation, the Government's cost of obtaining this information is not necessarily a monetary cost, rather it may be a time cost if there is a delay in meeting schedule requirements while waiting for additional information. Suppose the Government can specify a minimum requirement, but believes that improvements in desired performance will become known in the future. If schedule requirements are such that immediate award is necessary, a fixed-price-award-fee contract may be a viable and desirable option. Under such circumstances, the

award fee may be used to effectively communicate and incorporate such information into the product. In this situation, in general, the later the modification the costlier the product. These are performance-cost tradeoffs that can be dealt with after awarding the contract by using an award fee.

The desired improvement may not be limited to an improvement in level of performance, but could also be an improvement in the desired level of quality.

Another situation could exist where the Government is just unable or doesn't want to economically specify all the performance requirements at the beginning of the contract (i.e., at the time of award). This may be true even if the Government knows exactly what it wants at the time of contract award. In this case, the Government could use the award fee, its evaluation criteria, and subsequent evaluations over the life of the contract as a method of influencing the contractor to perform in a prescribed manner. This may be considered preferable by the Government in that this type of consultation and monitoring may be more economical and efficient.

C. ELEMENTS AND USE OF AN ECONOMIC MODEL

An economic model to contrast firm-fixed-price and fixed-price-award-fee can be used to demonstrate, in theory, the differences discussed above. Construction of this type of model includes the following characteristics:

The model must specify the minimum acceptable level of performance at the beginning of the contract and the

requirements that must be satisfied in the fixed-price portion of the FPAF (i.e., the deliverable product or service). The next step is determining the level of performance that would achieve an award from the award fee pool. An additional factor that must be considered in this area involves the rate at which the actual performance becomes more accurate in meeting the desired level of performance.

The next important element concerns contractor profit. Without any additional award from the award fee pool, this is a function of the fixed price paid by the Government minus the contractor's cost in producing at that performance level. Contractor's profit must be adjusted when performance is successfully improved and part or all of the award fee pool is awarded. In this case, the increase in the contractor profit is determined by the amount of award fee paid by the Government minus contractor's cost in meeting the modification that resulted in the payment of award fee.

Another measurement factor involves the net benefit to the Government. Net benefit to the Government, assuming no extra effort (i.e., no payment of award fee), includes the benefit from the product it receives minus the payment on the fixed-price portion of the contract. However, the Government incurs a cost in obtaining the information necessary to prepare the initial contract. This cost must also be subtracted.

Net benefit to the Government is slightly different when additional effort is expended by the contractor, resulting in

the payment of an award fee. This increase in the net benefit is the benefit achieved from the improved product minus Government cost for the award fee payment. Subtracted from this would be the costs to the Government in administering a FPAF contract. As discussed in later chapters, research has concluded this cost can be extensive.

Once constructed, this basic model can be utilized to help determine award fee structure. In a situation where perfect information exists for the Government and the contractor, the award fee structure will reflect the cost to the contractor and benefit or value to the Government. If this is the case, then the award fee pool will always be greater than or equal to the cost the contractor incurs for the extra effort, but less than or equal to the value as perceived by the Government. In addition, with perfect information, the rate at which the award fee pool is distributed should be constant over the life of the project or service.

Usually perfect information does not exist. Therefore, it is important to look at situations involving imperfect information. In a forthcoming paper titled, "Fixed Price Award Fee Structure in an Uncertain Environment", Dr. K. L. Terasawa and Dr. W. R. Gates of the Naval Postgraduate School theorized that award fee could be used to compel contractors to reveal their true expectations concerning the extra effort and cost in improving performance on a particular procurement.

In this situation, the amount of the award fee pool is based on the contractor's self admitted difficulty for a specific level of effort over and above the minimum requirements of the procurement. Basically, the award fee pool has an inverse relationship with what the contractor says is the required level of effort. The easier he states that the level of effort required will be, the larger the award fee pool, within the dollar limits specified by the customer. This increase in the award fee pool can be viewed as a payment for more accurate information. To prevent the contractor from underestimating the level of effort solely to increase the award fee pool, the rate at which the award fee pool is distributed can be manipulated. The amount of award granted decreases as shortcomings in performance increase. To offset the incentive to underestimate the level of effort, the amount of award fee granted should decline more quickly as the size of the award fee pool increases (i.e. as the estimated level of effort required decreases). In theory, this arrangement will force the contractor to reveal the true level of effort and associated costs and provide this information to the Government.

D. CONCLUSION

Once a contracting officer has determined a fixed-price contract is appropriate for a particular procurement, certain factors can be reviewed to determine if a fixed-price-award-fee, as opposed to firm-fixed-price, is an advantageous

pricing arrangement. The level of detail in a specific level of performance and the associated costs in obtaining the required information must be reviewed. Usually a firm-fixed-price contract requires a greater cost associated with obtaining the level of information necessary to reduce uncertainty and risk. However, the administrative costs of a firm-fixed-price contract are much lower than those associated with a fixed-price-award-fee. In some cases, an FPAF can allow the award of a contract to occur more expediently and still can result in obtaining a desired level of performance through use of an award fee. Information concerning that desired level of performance may not have been available when the contract was awarded. If a firm-fixed-price contract had been awarded that desired level of performance, initially unknown, would never have been achieved. Yet, with an award fee, it may be possible to achieve improved performance without a significant schedule delay.

In addition, award fee could be utilized to determine the proper structure and size of the award fee pool, as well as the rate of disbursement.

IV. MOTIVATION AND FIXED-PRICE-AWARD-FEE

A. INTRODUCTION

Contractor motivation is a critical factor in the successful completion of a Government procurement action. Incorporation of the "best" motivators when writing a contract is when a contracting officer has the most influence over the contractor regarding the performance of the required action. Award fee can be viewed as a continuous motivational method and can be described as a management process that spans the life of the contract. This differs from other contract types in that the span of control and changes in the type of control are limited once other types of contracts are awarded.

Government motivation can be increased by use of an award fee in that the Government still has the power to significantly influence and motivate the contractor after the contract is awarded. Specifically, with the evaluation criteria, the Government can select the areas they would like to influence and direct.

The fixed price portion of the FPAF contains its own motivational ability in that more efficient performance by the contractor in completing the contract will increase profit. Government motivation in the fixed-price arena is that a delivery of a final product is necessary for payment on the contract.

B. EFFECTIVE MOTIVATION

Victor Vroos, a noted behavioralist, stated that the strength of a person's desire or aversion for "something" is founded not on its intrinsic properties, but on the anticipated satisfaction or dissatisfaction associated with other outcomes to which they are expected to lead. [Ref. 19]

> Effective motivation of Defense contractors begins with good planning. The Government must assemble information on the product to be acquired, the Government constraints, the proposed contractor's objectives, and the proposed contractor's constraints. [Ref. 4]

Information on the contractor's objectives and constraints can be obtained through items such as cost and pricing data. In addition knowledge of labor supply, interest rates, stock price, and other business endeavors can allow the Government insight into the contractor's financial position and production capabilities. Trade journals can provide information on the contractor's environment.

> It almost goes without saying that for a truly effective incentive program, the Government by work or deed must insure the contractor his objectives can best be met by helping to accomplish the Government's objectives. [Ref. 5]

Since award fee is a management process with steady communication between the Government and the contractor, there is a greater probability that consensus on the objectives can be achieved.

It is widely accepted that factors other than profit have a profound influence on contractor motivation. Profit can be viewed as a "satisfier rather than a motivator. Contractors,

in most cases, will not perform without a certain profit level. Once that level of profit is achieved, they may not increase performance with additional profits alone." [Ref. 8] Although award fee provides additional profit for increased levels of performance, other motivational factors are involved.

Award fee contracting relies on more than just the profit motive. The evaluations conducted by the Government on the specified basis formally advise the contractor and th individuals employed by the contractor on the amount of fee awarded as well as the reasons for the award or absence of award. These evaluations are reinforcement of the contractor's performance or a penalty. This type of evaluation has an effect on the pride of an organization, the managers, and the workers and can act as an additional incentive. Thus, without even considering profit to the contractor, the evaluation can have a motivating impact on the managers and employees. [Ref. 20]

Abraham Maslow, in his famous study on the hierarchy of needs, found that the strongest motivation of man, after the basic needs of food, shelter, and a sense of belonging are met, is a need for esteem. [Ref. 21] The award fee process satisfies this need for esteem through the feedback of the evaluation and the fee awarded. Even if the cash portion of the award does not flow to managers and workers, the feedback of the evaluation can act as an ominous motivator. [Ref. 20]

The effective use of the evaluation process allows the managers and workers of the contractor to see what the Government likes and dislikes. It also gives the contractor an incentive to make the decisions and undertake the risk that is perceived as most beneficial to the evaluators. [Ref. 20]

C. CONTRACTOR OBJECTIVES

Objectives of the Government and the contractors cannot be pegged to a single, all-encompassing objective, rather there are multiple objectives on the part of both parties. The trouble is that in all too many cases only one objective is incentivised and other pertinent objectives are ignored. A disadvantage noted concerning incentive contracts is the Government's inability to incentivise simultaneously all the important aspects of a contract. When a single one is incentivised, usually the Government allows the requirements of other elements to slip. [Ref. 4:p. 22]

This is where the elements of an award fee can be of greater success than other types of incentives. Several performance elements can be incentivised simultaneously with an award fee, overcoming one of the biggest disadvantages of other contract types.

Contractor objectives can be divided into contractual objectives and long term corporate goals. Specific objectives of the contractor usually include earning profits (short term and long term), insuring company growth, providing a good product, maintaining or increasing market share, developing

new skills, guaranteeing follow on work, minimizing risk, controlling one's destiny, safeguarding proprietary interests, utilizing excess capacity, and improving cash flow. [Ref. 6:p. 15] Review of past performance can identify objectives that were obtained previously. However, most research in the field of determining contractor objectives was conducted by asking the contractors to list their most important objectives. (Usually the top 3).

Once the prioritized objectives of a specific contractor have been determined, contractor performance will be improved if the Government helps in the achievement of these objectives. Award fee can be utilized as an incentive for many of the common objectives noted. For example, if the contractor sets up his operation to produce a higher quality product than required by the minimum specifications of the Government, in an attempt to receive more award fee, this may allow the use of excess capacity. The award fee could provide additional funds to pursue more efficient technology. Award fees can obviously improve cash flow if the amount of the award fee exceeds the additional cost of the risk undertaken. Indirectly, achieving a top quality product could possibly lead to follow on work, because the final product is so much better than the competition.

D. GOVERNMENT OBJECTIVES AND MOTIVATION

The Government, like the contractor, has many different objectives on any given contract. Three primary objectives include:

1. Obtaining the items specified in the contract.
2. Obtaining it at a fair and reasonable price.
3. Delivery of the item in a timely manner.

Other contractual objectives include socio-economic objectives. (i.e., Buy American) These extra-contractual objectives significantly affect Government contractual behavior, other than the natural desire to motivate contractors. The Government is under significant legal and formal constraints. Because of this Government contracting officers usually have little autonomy in conducting contracting operations. Basically the Government is vulnerable to many external sources, including Congressmen who may be influenced by the desires of their contractor constituents.

Award fee could be used specifically for many of the Government objectives. For example, part of the award fee pool could be awarded for the achievement of Small and Disadvantaged Business goals by major contractors. The amount of the award fee pool could be dependent on the fixed price the Government and contractor agree on. If it were inversely related, the contractor would have an objective to keep the fixed price portion of the contract as low as reasonably

possible. Care must be taken in this case to prevent "buying in" in hopes of making up the difference with award fee money. It must be paramount that the award fee only be awarded for additional effort that results in something of value for the Government.

One of the most important Government objectives concerns design to cost (DTC). DTC is a managerial concept where explicit cost goals are set during development. In a development contract, DTC is implemented through a design to unit production cost (DTUPC) provision to ensure the contractor controls cost. Researchers have determined award fee has a "statistically significant" influence on DTUPC attainment and it can influence DTUPC. [Ref. 22:p. ii] These studies were based on Cost-Plus-Award-Fee contracts. In FPAF contracts, some cost control motivation has been achieved by use of a fixed-price contract. However, award fee influence could be used to control costs incurred to design a product superior to the minimum requirements specified by the Government.

Government motivation to utilize award fee can be severely diminished if the award fee is set up in a method that requires Government resources that are not available. The administration of an award fee contract could possibly overwhelm, in time and people, any savings achieved by use of the contract type.

E. FIXED-PRICE-AWARD-FEE TO ACHIEVE QUALITY

Quality of products or services is a significant factor in the attainment of company growth and increases in market share. However, quality of products also has an effect on the prestige of a firm. Quality obviously leads to prestige in almost every market. Quality is of such extreme importance, firms have embraced programs such as Total Quality Management (TQM) as preached by E. Deming, as well as other types of similar quality programs.

Attainment of quality requires all managers and employees of a firm to be involved in the process. Quality programs, such as TQM, require a culture where quality is built in to the manufacturing inspection. As stated previously, it requires the support of all involved. [Ref. 22]

Award fee lends itself to this total involvement. As stated previously, award fee is a management process in which the evaluation process can affect all of the individuals involved. Therefore, it lends itself to improvement of quality in products or service. It can be a motivational approach that affects junior or non-supervisory contractor personnel, who in many cases have a significant impact on eventual quality.

F. FIXED-PRICE CONTRACTOR MOTIVATION

The most basic incentive in contracting is involved in the fixed-price contract. In a firm-fixed-price (FFP) contract, all cost risk is borne by the contractor. The contractor

provides a product or a specified level of service for a specified period of time for a specific price. The FFP gives the contractor considerable incentive to control costs, since this would increase his profit. Contracting literature generally states that FFP contracts work well for simple functions which are easily defined and subject to minimal or no change.

G. FIXED-PRICE GOVERNMENT MOTIVATION

A firm-fixed-price contract requires a delivery of a product or service to the Government. The costs to the Government in this type of contract are fixed. The resulting incentive for the contractor to control costs and increase short profits could be a disadvantage to the Government. This is because contractors can control costs by possibly "cutting corners" and sacrificing quality. This is a short term profit objective in that the poor quality of the delivered product could affect future contract awards to the firm.

V. DATA PRESENTATION AND ANALYSIS

A telephone survey of Government and defense contractor contracting personnel was conducted to determine possible advantages and disadvantages of the Fixed-Price-Award-Fee contract by those individuals who would be involved in the award and administration of such contracts for their Government procurement offices or their companies. The survey involved conversations with 16 individuals who were deeply involved in the contracting arena for their employer. The results of the survey were compiled to determine the major areas of concern for the Government from the Government point of view and the contractor from the contractor point of view. Many opinions and thoughts concerning award fee and the FPAF contract type were expressed, however, most of the findings fell into the categories noted below.

A. ADVANTAGES TO THE GOVERNMENT IN UTILIZING A FIXED-PRICE-AWARD-FEE CONTRACT

1. Communication

The fixed-price-award-fee contract is an incentive structure that offers several advantages to the Government when it is employed. The advantages available are dependent on how the contract is used. A survey of Government contracting officers and administrators indicated that the award fee places the Government in a better position to obtain the performance that they desire. Furthermore, an award fee,

either with a cost or fixed-price contract type, allows more and better communication between the Government and the contractor.

The award fee structure, with its periodic evaluations, ensured that relevant communication occurred on a regular and continuous basis. The Government personnel interviewed felt that this in itself was a definite advantage because there were "no surprises" for either side if the award fee evaluations were used properly. All necessary personnel were aware of and familiar with the contract situation at any given time. With the award fee the Government has more daily interaction with the contractor and greater insight into the contractor's actions. Care must be taken to ensure that with involvement of large numbers of Government and contractor personnel specific decision responsibility lines are maintained. If lines of responsibility are not maintained critical decisions could be decided by unauthorized personnel leading to an undesired outcome. This diffusion of the responsibility could undermine the success of the contractual agreement.

2. Responsiveness

The award fee's periodic evaluations were conducted on a regular basis that varied from monthly to semi-annually as indicated by the personnel interviewed. Government personnel felt the evaluations contributed to the contractor's willingness to cooperate with the Government on the evaluation

criteria. Government personnel felt the contractor was significantly more responsive to the Government's requests or desires when addressed through the use of award fee. The flexibility of the award fee, in changing evaluation criteria throughout the life of the contract, allowed the Government to shift the emphasis of the contractor's efforts as often as there were evaluation periods. The responsiveness of the contractor is increased significantly if the evaluation periods are of shorter duration.

3. Risk Assignment

The fixed-price portion of the award fee ensures that a deliverable product will be produced or else the contractor will be in default of the contract. This is a profound difference from cost-plus-award-fee (CPAF) contracts in that cost contracts, by their nature, only require the contractor's best efforts towards successful completion of the requirement specified in the contract. The FAR states:

> A firm-fixed-price contract provides for a price that is not subject to any adjustment on the basis of contractor's cost experience in performing the contract. This contract places upon the contractor maximum risk and full responsibility for all costs and resulting profit or loss. It provides maximum incentive for the contractor to control costs and perform effectively. [Ref. 1:p. 16.202]

Maximum risk is placed on the contractor because he is responsible for delivery of the specified product. Since there is basically a guarantee that the contractor will deliver, the award fee portion can then be used to achieve "better than average" performance on that deliverable product.

In addition, both the maximum potential award fee pool are pre-specified in a FPAF contract. Thus, Government contracting personnel are not "worried" that large sums of money will be spent without anything to show for it.

4. Motivational Tool

In the survey Government personnel felt the award fee was an effective motivational tool that could be utilized to obtain more effective performance by the contractor. The additional profit that could be earned could be very effective, especially if the contractor's main concern was profit. The critical element in this area was that the award fee pool be of an adequate amount to effectively act as a motivator.

In a situation involving a requirement dictating equal effort throughout the life, such as a services contract, it is critical that the award fee pool be evenly distributed, if earned, throughout the life of the contract. This is necessary to ensure that each evaluation period was considered of equal importance by the contractor. If too much of the pool was awarded early, Government personnel felt the contractor "slacked off" in his performance because he has already earned the bulk of what was available and there was no point in providing extra effort above the minimum requirement. Basically, if too much of the award fee was awarded early in the life of the contract, the contract lost its motivational ability.

If the effort desired and structured to be awarded through the award fee pool requires differences in effort and risk it is not prudent for the award fee pool be evenly distributed. Greater effort and risk incurred by the contractor should be rewarded with the appropriate award fee amount.

5. Subjective Evaluation not Subject to Dispute

The Government official has the authority to determine if the criteria have been met and how much the Government feels the effort is worth. At the same time, they do not have to worry about the possibility of their decision being disputed. Government officials felt this was a notable advantage of award fee contracts.

B. DISADVANTAGES TO THE GOVERNMENT IN USING A FIXED-PRICE-AWARD-FEE CONTRACT

1. Burdensome

The effective and fair administration of an award fee was extremely burdensome on Government personnel. Most Government personnel felt that they didn't have the manpower or resources to administer very many award fee contracts. Although many agreed that the fixed price portion of an FPAF significantly reduced the administrative burden in comparison with a CPAF, the actual administration and distribution of the award fee was very difficult and required a great deal of paperwork on the part of the Government. A case in point, Government personnel gave examples of evaluation criteria that ranged from five to six goals covering two pages to thirty

goals listed over 42 pages. The latter being very difficult, if not impossible, to administer properly.

Almost all Government personnel were adamant in insisting the award fee goals and criteria be kept to the minimum required to achieve the most important elements of the contract. The greater the number and extent of criteria the more the contractor feels the Government is too involved in his day to day operation. The contractor would be stifled by the bureaucratic involvement of the Government. It could cause the contractor to ignore the goals required for the award fee and become content with meeting minimum standards. This would limit his profit to the amount determined by the fixed price portion of the contract. He would incur no additional risk, the Government would not obtain any additional quality, and the award fee would be rendered useless.

The number of people that are involved on the part of Government in the administration of an award fee is substantial. Correct administration requires a detached third party to act as award fee determining official. In addition, representatives are required from each of the parties involved. These participants should have some hands-on experience and people with the proper qualification could be difficult to locate.

Some Government personnel specifically noted that the burden of administering an award lessens the contract's

attractiveness and that they would be more inclined to use a fixed-price incentive type contract if they had the choice.

2. Difficulty in Writing Good Evaluation Criteria

Related to the previous disadvantage was the concern expressed by many of the personnel interviewed that effective criteria were very difficult to determine and specify in writing in the contract. The difficulty arises in determining what criteria would be the most effective in obtaining the desired effect. This is what leads to an expansion of evaluation criteria. In order to be sure that all areas of concern are covered, Government personnel feel that they can't limit the criteria and goals. This difficulty is also dependent on the type of material or service being procured. The more complex the effort, the more Government personnel felt evaluation criteria were difficult to establish.

3. Difficult to be Timely

The lack of adequately trained personnel in numbers sufficient to handle the procurement workload made it difficult to be timely in evaluation and subsequent award fee determination and payment. If this area of an award fee contract is not timely, one of the major benefits of award fee contracts is lost.

4. Hard to Quantify of How Much of the Award Fee Pool to Award

Although it is important not to "front load" the award fee by giving it all to the contractor prior to successful

performance, Government personnel expressed concern over how to determine what a specific level of performance is worth in terms of dollars. If the contractual effort is even throughout the life of the contract, this is not that great a problem. However, if there are considerable differences in level of effort throughout the life of a contract, then being fair and objective in determining what amount of dollars to award can be extremely difficult. It also tends to become arbitrary, which can defeat the incentive of a fixed-price-award-fee contract.

5. Contractor Gaming

Another concern of Government personnel regarding award fees is the thought process of the contractor who is writing a proposal in response to a request for proposal (RFP) specifying the use of an award fee contract type. Specifically, it was felt that the contractor would describe his minimum acceptable effort at a level lower than he might have otherwise, knowing he could improve on that effort and thereby achieve a greater share of the award fee pool without any extra risk or effort.

Prevention of this type of gaming requires that the Government ensure the statement of work accurately describes the minimum acceptable level that will satisfy the requirement. Then, it is important to ensure that if this is the level of effort the selected contractor expends, then no award fee should be awarded. In this case it is important to accept

that the contractor is only providing what the Government asked for.

C. ADVANTAGES TO THE CONTRACTOR IN USING A FIXED-PRICE-AWARD-FEE CONTRACT

1. The Award

If significant, the award is always worth pursuing. Although it has been established that profit may not always be the sole motivation of all contractors, for most contractors it is important. Any opportunity to obtain additional profits is worth pursuing. Contractor's were very specific that they would be very willing to cooperate with the Government in any effort that would provide additional profit. Some of the contractors interviewed specified that additional profit in most cases would be indirectly returned to the customer (the Government) because most of that money would be reinvested in the company's research and development effort. Research and development could provide the Government a better product, if not now, in the future.

2. Communication

Contractors felt that if the evaluation criteria were reasonable and specific, then communication between the Government and the contractor was enhanced. Specifically they felt that they had a definite idea as to what the Government wanted. They considered this of major importance because some of the contractors interviewed had been in situations, involving other contract types, where they had a difficult

time figuring out what the Government wanted. The routine evaluations, throughout the life of the contract, continually provided specific inputs as to what was important to the customer. Knowledge of what the Government wanted allowed the contractor to satisfy what is of major importance to most good contractors in the long run, keeping the customer satisfied.

3. FPAF Allows Flexible Opportunity to Earn Additional Profit

Discussions with contractor personnel noted that the use of an award fee with a fixed-price contract constituted an additional opportunity to earn profit. They felt an FPAF was a very viable idea and that they would react favorably to its use. They saw the fixed-price portion of the contract, with its own assigned profit, as an opportunity to make additional profit by performing efficiently to achieve the requirements. After the fixed price portion was considered, they felt that the award fee was a bonus for performing specific "extra" items. The fixed price enabled the company to obtain profit on the minimum effort and product quality specified by the Government. Then, the award fee gave them the flexibility of choosing between the extra efforts the Government desired, and they could choose those areas they felt they could achieve with minimum risk. If all areas of the evaluation criteria were attainable they could go for the entire "bonus". Many considered this the "best of both worlds."

D. DISADVANTAGES TO THE CONTRACTOR IN USING A FIXED-PRICE-AWARD-FEE CONTRACT

1. Time Delay Between Evaluation and Payment

Cash flow is extremely important to almost every defense contractor. Prompt payment by the Government is a problem even when an award fee is not involved. However, in order for the Government to optimize the award fee's motivational capability, payment from the award fee pool should occur as soon as possible after the evaluation period. If payment does not occur quickly, the contractor could lose interest in incurring additional risk to meet the award fee goals. Many contractors noted delays over 4 months between the evaluation period and award fee payment based on that evaluation. For some this meant the next evaluation period had closed before payment had been received for the previous period.

2. Biased Evaluation on the Part of Government Personnel

Although the survey research did not note any instances where contractors believed this actually occurred, the possibility remains a primary concern of the contractor. The fear concerns the subjectiveness of the evaluation and the lack of an avenue for disputes. This is considered an advantage on the part of the Government, however contractors suggested that individuals concerned with self promotion and saving the Government money might not award a fair payment for the award fee earned. This is especially true if the biased individual is the award fee determining official (AFDO).

E. OPTIMAL USES OF FIXED-PRICE-AWARD-FEE BASED UPON CONTRACTOR AND GOVERNMENT NOTED ADVANTAGES AND DISADVANTAGES

The optimal use of a fixed-price-award-fee contract requires that a significant dollar value be involved and that the Government be willing to devote sufficient, qualified personnel resources to ensure the contract is properly written and administered. It should probably involve a contract that covers at least two years, to provide for several evaluation periods in which the Government can express their desires and the contractor can respond. During the life of a contract, there should be enough change that quarterly evaluation periods are necessary to keep all pertinent parties informed of the progress of the contract. If shorter evaluation periods are required, the Government must be willing to provide additional personnel to assist in the administration process. Finally, evaluating officials and the Government paying office must be prompt in paying the contractor if the fee is awarded.

The type of product that should be acquired utilizing an FPAF contract should meet the requirement of a fixed-price contract in that there should be a certainty that the product can be produced. Secondly, there should be "room for improvement" between the minimum requirement of the Government and what can be produced with additional effort. Finally, the output of this additional effort must be of value to the Government.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The following conclusions apply to this research effort.

1. The FIXED-PRICE-AWARD-FEE ensured that relevant communication occurred between the Government and contractor on a regular basis. Improved communication significantly enhanced the quality of the final product. Specifically, for the contractor, it increased their understanding of what was required by the Government. By increased understanding of what was required, contractor's felt it allowed them to keep the customer satisfied.

2. The major problem to the Government is that the FPAF is extremely burdensome. Many Government contracting personnel expressed opposition to the use of any type of award fee contract because of the demands it placed on their personnel. The combination with a fixed-price type contract improved their outlook towards the contract but not significantly enough to be willing to use the contract type very often.

3. The major problem expressed by contracting personnel concerned the time delay between evaluation and payment. This is obviously related to the burden an award fee contract places on Government contracting personnel. If this delay became excessive it completely destroyed the motivational ability of the FPAF pricing arrangement. In addition, for

many contractors, cash flow was extremely critical. Any delay in expected payments caused serious business management problems for their firm.

4. FPAF is an excellent motivational tool to achieve quality. Award fee, because of its enhanced communication ability, can lend itself to the total involvement of all personnel involved in the manufacturing or service process, if the evaluations are properly utilized.

5. If the award fee pool is significant, most contractors welcome the use of a FPAF pricing arrangement. Any opportunity to earn additional profit is welcome. In addition, most contractors would be readily willing to invest the extra time, risk, or investment if the award fee would cover the cost and provide a reasonable profit or even just cover overhead and allow growth of the firm.

B. RECOMMENDATIONS

1. Fixed-Price-Award-Fee (FPAF) Contracts should only be utilized if the Government has the resources to properly administer the contract.

Many Government contract administrators viewed award fee contracts in general with disdain because they became impossible to administer properly. Staffs were usually overburdened and the additional administrative steps necessary with an award fee contract only added to their burden. Because they did not have time to ensure evaluations were conducted properly and award fee pool distributions were fair, the contract lost its motivational effect. If the company did

not see prompt results from evaluations, in the form of payments, they too became disinterested in the contract type. Government personnel by far favored firm-fixed-price (FFP) contracts.

2. **<u>If contractor responsiveness is of high priority, the fixed-price-award-fee contract can be very effective.</u>**

The ability to change evaluation criteria during the course of the contract allowed the Government to steer the contractor in the direction they wanted. It seemed to ensure the contractor would respond in an efficient and timely manner. Contractors were significantly more responsive to Government requests when addressed through the use of the award fee. This did require that evaluation periods be conducted on a regular basis and that the life of the contract include several evaluation periods.

3. **<u>Fixed-Price-Award-Fee will be accepted by the contractor more easily if the contract requires an equal level of effort over the life of the contract.</u>**

Equal level of effort over the life of the contract will allow the award fee pool to be equally distributed over the life of the contract. This will allow the Government to be fair and reasonable with how the award fee is awarded. This reduces the chance that the Government will be arbitrary in its award, which relieves a major concern of many contractors.

4. <u>The level of information required can be utilized to help determine what contract type (FFP or FPAF) would derive the most net benefit to the Government.</u>

The level of detail in a specific level of performance and the associated costs in obtaining the required information can be significant. If flexibility of specifications is a necessity because of lack of specific information, the Fixed-Price-Award-Fee contract should be utilized. However, cost savings in information detail must be weighed against administrative costs.

C. ANSWERS TO RESEARCH QUESTIONS

1. <u>In what situation might a Fixed-Price-Award-Fee contract be utilized to provide for an effective use of the incentive in the Federal acquisition process?</u>

The best situation for effective use of a Fixed-Price-Award-Fee is one where the product or service will be provided over a long period of time, which allows for several evaluation periods adding to the motivational effect. In addition, it should only be used when the administrating office has the resources to effectively administer the contract, and can devote those resources to the administration. The product or service must have distinguishing levels of performance or quality that can be rewarded with award fee if achieved. Finally, the contract will be most effective if the contract requires extensive communication between the Government and the contractor. The FPAF helps focus that communication to achieve the desires of the Government and rewards the contractor for his responsiveness.

2. **<u>How do defense contractors and Government officials view the use of Fixed-Price-Award-Fee as an incentive arrangement in conducting business?</u>**

Almost unanimously, defense contractors were very positive towards the use of Fixed-Price-Award-Fee. They had no negative comments towards the contract type other than some felt it was another control mechanism used by the Government. The Government had mixed feelings towards the contract with extremely negative comments coming from those who would have to administer the contract.

3. **<u>How might a Fixed-Price-Award-Fee contract be structured to provide for an effective use of award fee incentives in the Federal acquisition process?</u>**

The Fixed-Price-Award-Fee contract should be structured to ensure the award fee is distributed properly for increased level of effort on the part of the contractor. These increases in the level of effort should be easily defined and should be well publicized to the contractor. The award fee pool should be substantial enough to ensure that the contractor will be motivated to increase his level of effort in hopes of receiving an award fee. Finally, a fixed-price-award-fee contract should only be utilized if a minimum standard of the product or service can be defined by the Government in the event the contractor is not motivated by the award fee.

D. AREA FOR FURTHER RESEARCH

An area for further research in this field involves determining the administrative cost of utilizing a fixed-

price-award-fee contract. Determination of this cost could greatly aid in determining whether this type of contract should be utilized more often in the Federal acquisition process.

APPENDIX A

LIST OF PERSONNEL INTERVIEWED

1. Ayers, Jeffrey, Director of Large Contracts, Naval Supply Center, Bremerton, Washington, Interview, September 1990.

2. Becker, Rich, Contracting Officer, Delfin Systems, Sunnyvale, California, Interview, August 1990.

3. Foster, H. B., Director, O&M Services, United Airlines Services Company, Bangor, Washington, Interview, June 1990.

4. General, John, Chief Executive Officer, Delfin Systems, Sunnyvale, California, Interview, August 1990.

5. Johnson, Greg, Defense Contract Administrative Management Area (DCASMA) San Diego, California, Interview, September 1990.

6. Kennedy, John J., Professor, University of Notre Dame, Notre Dame, Indiana, Interview, June 1990.

7. Larson, Robert D., Procurement Division Director, Department of Energy, Richland, Washington, Interview, August 1990.

8. McDowell, William, Asst Director of Contracts, Naval Supply Center, Charleston, South Carolina, Interview, August 1990.

9. Miller, Richard, Defense Contract Administrative Management Area (DCASMA) San Francisco, California, Interview, September 1990.

10. Morrison, David, Director of Contracts, ARGO Systems, Santa Clara, California, Interview, August 1990.

11. Petoff, Richard, Contract Administrator, Westinghouse Corporation, Richland Washington, Interview August 1990.

12. Quigley, David, Procurement Specialist, Westinghouse Corporation, Richland Washington, Interview, August 1990.

13. Russell, Art, Lockheed Missile Systems, Santa Clara, California, Interview, August 1990.

14. Schauber, Jon Contracting Officer, Naval Supply Center, Charleston, South Carolina, Interview, August 1990.

15. Sullenberger, Jim, Contract Administrator, Kirtland Contracting Center, Albuquerque, New Mexico, Interview, September 1990.

16. Turner, Charles L., Purchasing Manager, CP National, Walnut Creek, California, Interview, September 1990.

17. Tuttle, David, Contracting Division Chief, Kirtland Contracting Center, Albuquerque, New Mexico, Interview, September 1990.

APPENDIX B

INTERVIEW QUESTIONNAIRE

1. What is the purpose, as you perceive it, of the award fee incentive?

2. Do you think the award fee incentive can be applied to fixed-price contracts?

3. If the award fee incentive is applied to a fixed-price contract what are the advantages for the Government/contractor?

4. What are the disadvantages to the Government/contractor?

5. Has your agency used a fixed-price-award-fee contract or the award fee with other types of fixed price contracts? Do you know of any agencies that have used this type of contract?

6. If the award fee incentive is applied to a fixed-price contract should the contract structure be similar or different than if used in a cost reimbursement contract?

7. How might an FPAF contract be structured to provide for an effective use of award fee incentives?

8. What do you think is the best acquisition situation in which to use an FPAF contract?

9. What is wrong with current contract types that could be remedied by FPAF? If not FPAF, then what?

10. How should award fee evaluations be structured to maximize the effectiveness of an FPAF contract?

11. Are Award Fee contracts good at getting what the Government wants?

12. How should award fee evaluations be structured to maximize their effectiveness?

LIST OF REFERENCES

1. Federal Acquisition Regulation (FAR) U. S. Government Printing Office, 1984.

2. Nolan, Arthur J. "Incentive Contracting in the Aerospace Industry (Part I) National Contract Management Journal, Summer 1980, pp. 35-40.

3. Department of Defense Directive 5000.1, "Major and Non Major Defense Acquisition Programs" 1 Sep 87.

4. Pilgrim, Calvin, "The Role of Incentives in Motivating Defense Contractors" Florida Institute of Technology, Melbourne, Florida, November 1986.

5. Williams, R. F., Carr, D. M., "Contractor Motivation Theory and Application" Army Procurement Research Office, March 1981.

6. Jaggard, M. F., Cartwright, H., "An Assessment of Factors that Motivate Navy Contractors"Naval Postgraduate School, Monterey, California, December 1982.

7. Peeters, W. A.; Veld, J., "The Use of Alternate Contract Types in Europe as Protection Against Overruns" National Contract Management Journal, Summer 1989 pp. 23-35.

8. Wight, Terry E., "Profit as a Motivational Tool: Fact or Fiction" Naval Postgraduate School, Monterey, California, August 1984.

9. Weitzman, Martin L., "Efficient Incentive Contracts" The Quarterly Journal Of Economics, June 1980.

10. Kennedy, John J., "The Appropriate Use of Incentive Contracts" University of Notre Dame, Notre Dame, Indiana, November 1985.

11. Hunt, Raymond G. "Concepts in Federal Procurement: The Award Fee Approach. Management Strategies That Work, Vol 18, No 2, Second Quarter 1982.

12. Scherer, Frederic M. "The Weapons Acquisition Process: Economic Incentives" 1964.

13. McClelland, Holly R., Odor, David D; "Determination of Contract Suitability to the Award Fee Concept" Air Force Institute of Technology, Dayton, Ohio, June 1981.

14. Handbook for CPAF Contracts, Headquarters, U. S. Army April 1985.

15. Kennedy, John J. "Can Award Fee Contracts Substantially Improve the Acquisition Process" University of Notre Dame, Notre Dame, Indiana, December 1989.

16. Meiners, Arthur J. "Simplified Cost Plus Award Fee Contracts" Marymount University, Washington D. C., December 1989.

17. Webster, Christopher W., "The Suitability of Fixed Price Award Fee Contracts for the Navy Commercial Activities Program" Naval Postgraduate School, Monterey, California, June 1988.

18. Kennedy, John J., "Incentive Contracts and Cost Growth" University of Notre Dame, Notre Dame, Indiana, 31 October 1983.

19. Vroos, V., Work and Motivation, Wiley; 1964.

20. Demong, R. F., "Award Fee Contract as a Program Management Tool" Proceedings of the 1983 Federal Acquisition Research Symposium, 1983.

21. Maslow, A. H., Motivation and Personality, New York: Harper and Row, New York, New York, 1970.

22. Beeckler, Eugene C., and Correia, Charles A., "Award Fee Influence on DTUPC" Army Procurement Research Office, March 1983.

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